

Motorcycle Injury Costs and Insurance Coverage

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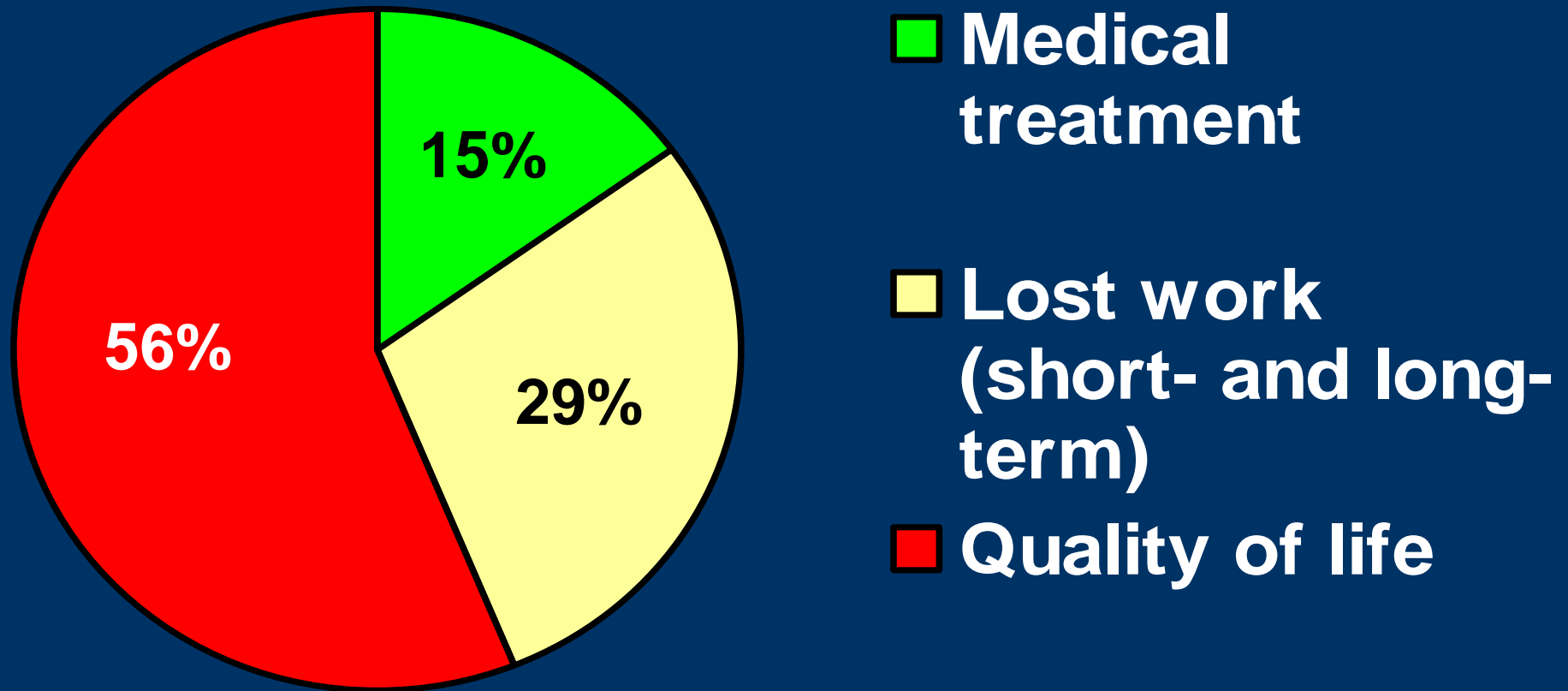
Overview

- **Cost of motorcycle crashes**
- **Effect of helmets on costs**
- **Motorcycle insurance**

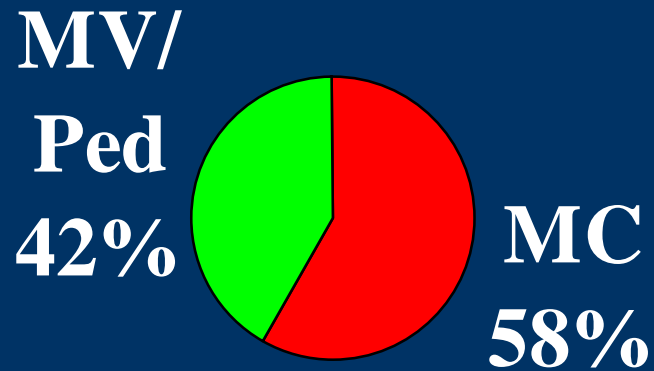
Estimates Run for This Presentation

- **NHTSA data sets (2005 GES, 1997-2003 CDS, NASS 1984-86 for non-CDS strata)**
- **NHTSA crash costs by diagnosis (e.g., broken leg, TBI); but @ a 3% discount rate (complying with health policy standards)**
- **In 2005 \$**

MC Crash Injuries Cost \$17.4B in 2005

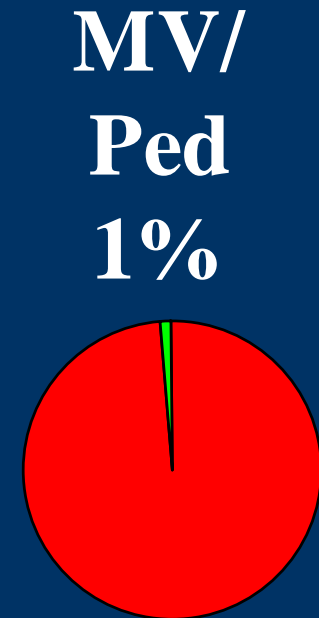


190K People in Police-Reported MC Crashes in 2005



People

Injury
Costs



MC
99%

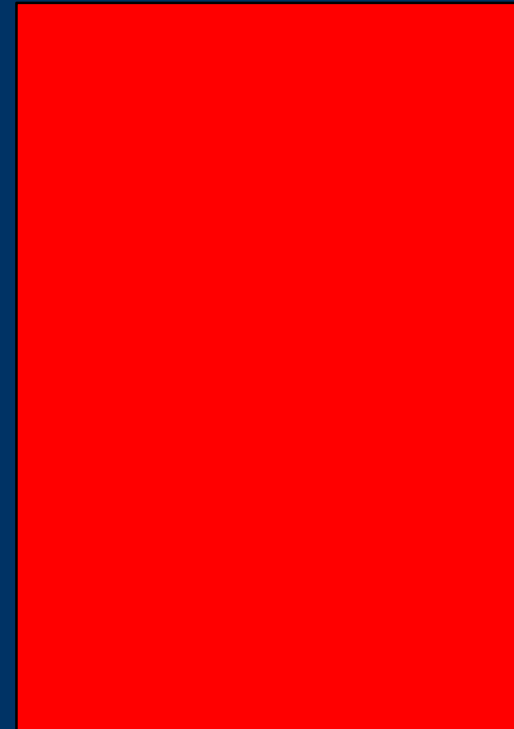
51% of Cost = Motorcycle-only Crashes (48% of the Crashes)

\$8.9B



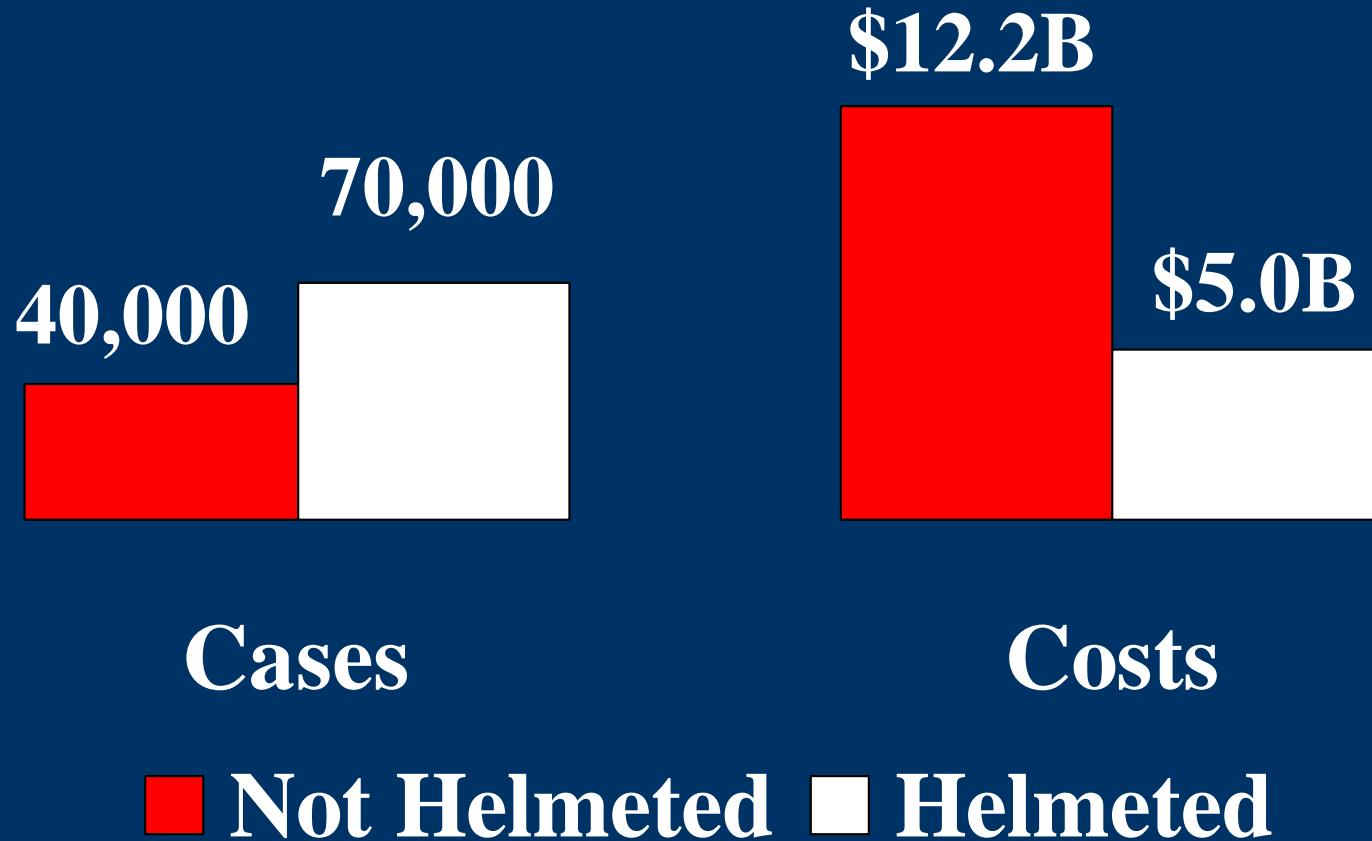
MC Only

\$8.5B

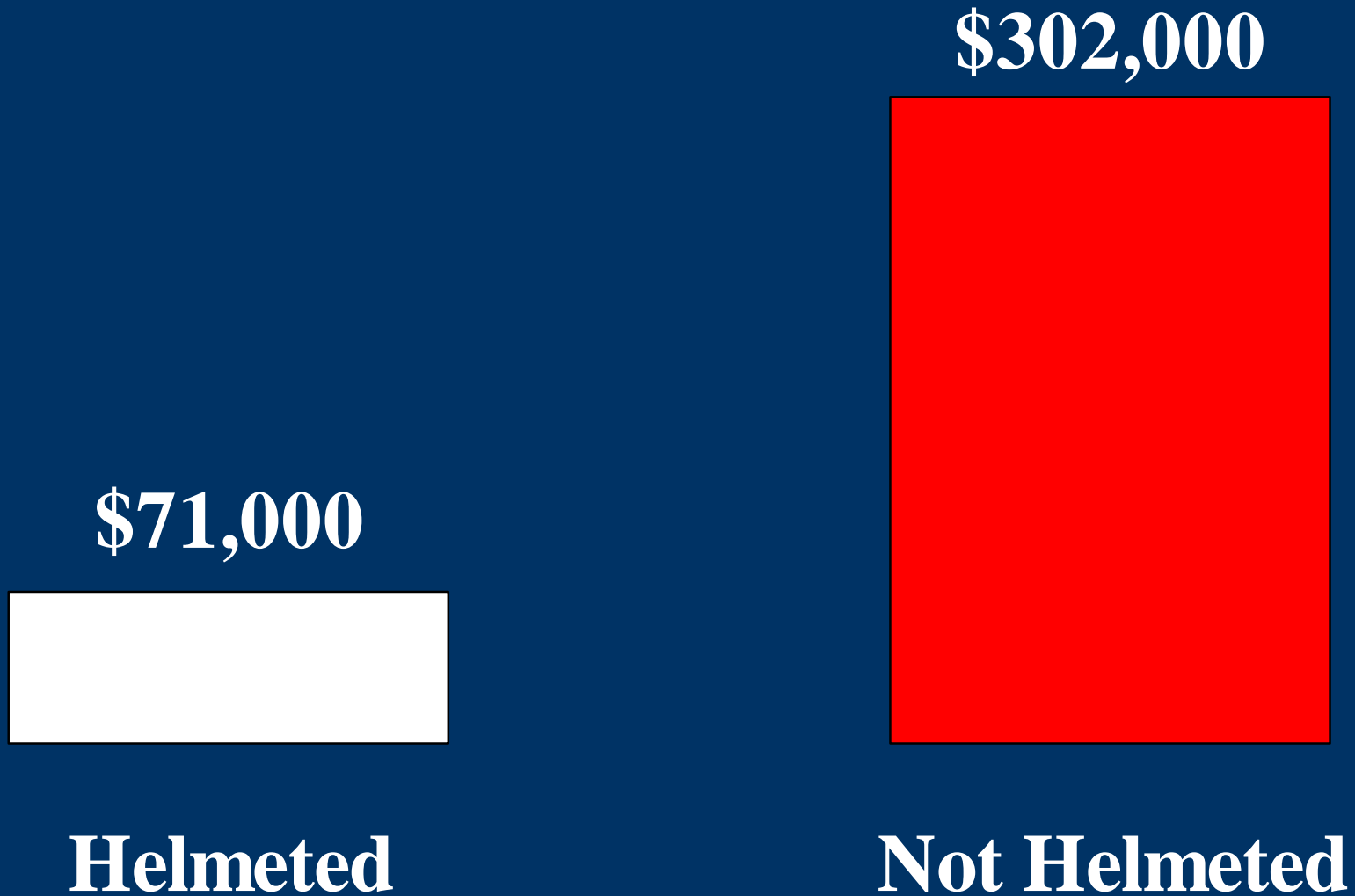


MC + MV

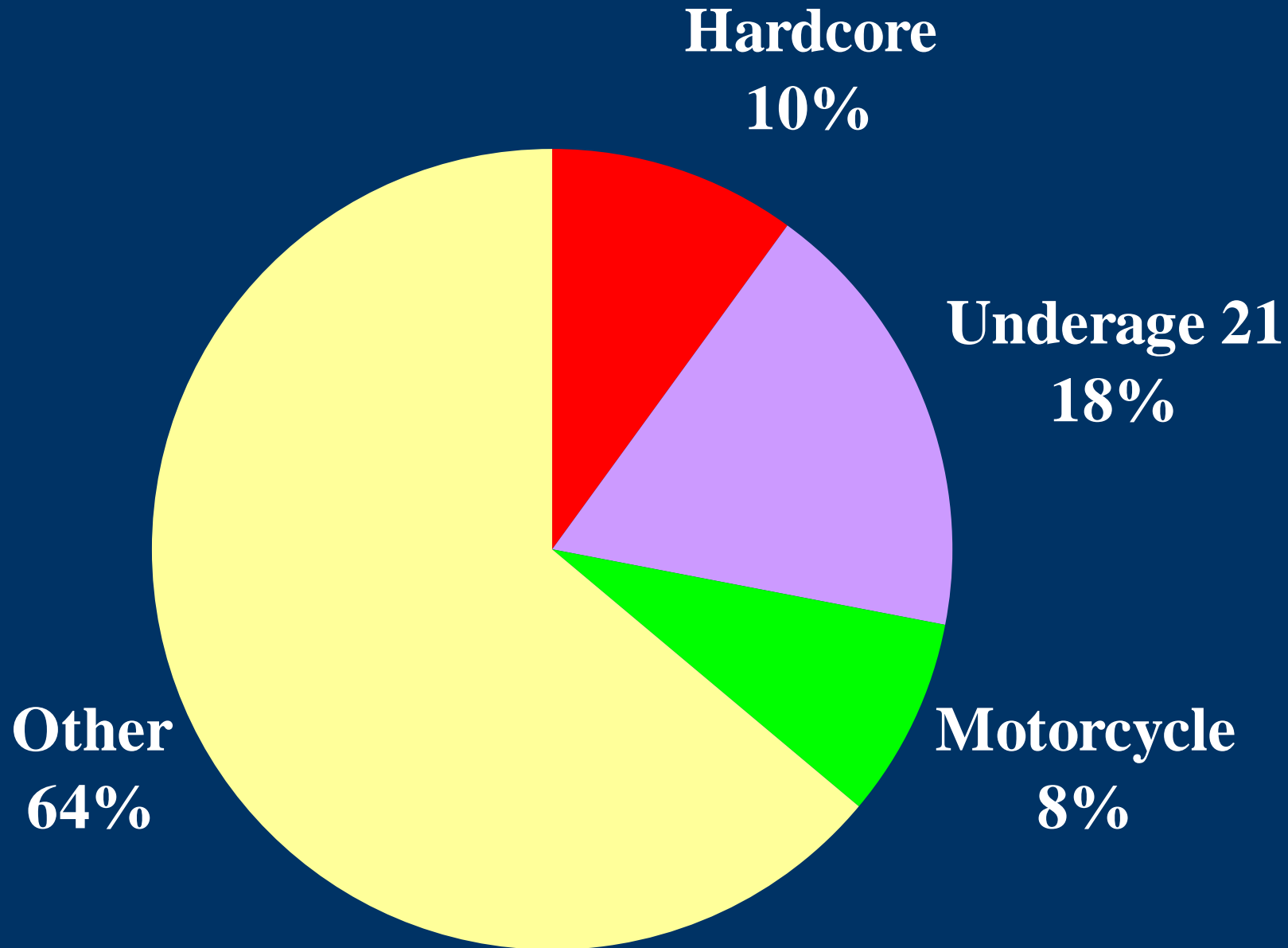
Motorcyclists In Police-Reported Crashes



Cost/crash-involved motorcyclist



DWI Deaths (34% of MC Deaths)



Costs of Injuries Resulting from Motorcycle Crashes: A Literature Review

Bruce A. Lawrence, Ted Miller

Pacific Institute for Research & Evaluation

Wendy Max

Institute for Health and Aging

University of California, San Francisco

Began with references to nearly 200 articles, identified 25 motorcycle safety studies that met these selection criteria:

- Addressed costs of injuries from motorcycle crashes.**
- Published in the 1990s (or not previously reviewed).**
- Presented original research.**
- Involved human subjects.**
- Published in the English language.**

Each selected article was then carefully read and critically reviewed by at least two readers.

Selected Measures of Comprehensive Costs (1997 dollars)

Average cost ...	Miller & al.		Wang & al.	
	Motorcycle	All road vehicles	Motorcycle	All road vehicles
per 1,000 VMT	\$2,090	\$178	\$2,331	\$197
per vehicle annually	\$4,766	\$2,068	\$5,410	\$2,340
per vehicle lifetime	NA	NA	\$35,830	\$25,330
per crash	\$211,000	\$17,000*	\$206,460	\$52,610

* Car/van

Hospital Charges per Case by Place of Treatment

	Helmet	Nonhelmet	Ratio
Fatal (Nelson & al.)	\$2,758	\$8,396	3.04
Trauma Center (Four studies)			
Mean	\$15,650	\$21,625	1.38
Range			1.06 - 1.85
Hospital-admitted (Five studies)			
Mean	\$12,550	\$19,690	1.57
Range			1.08 – 2.91
Emergency Dept. (Kelly & al.)	\$5,852	\$7,208	1.23
All Crashes (Weiss)	\$10,564	\$12,291	1.16

Inpatient Charges per Case

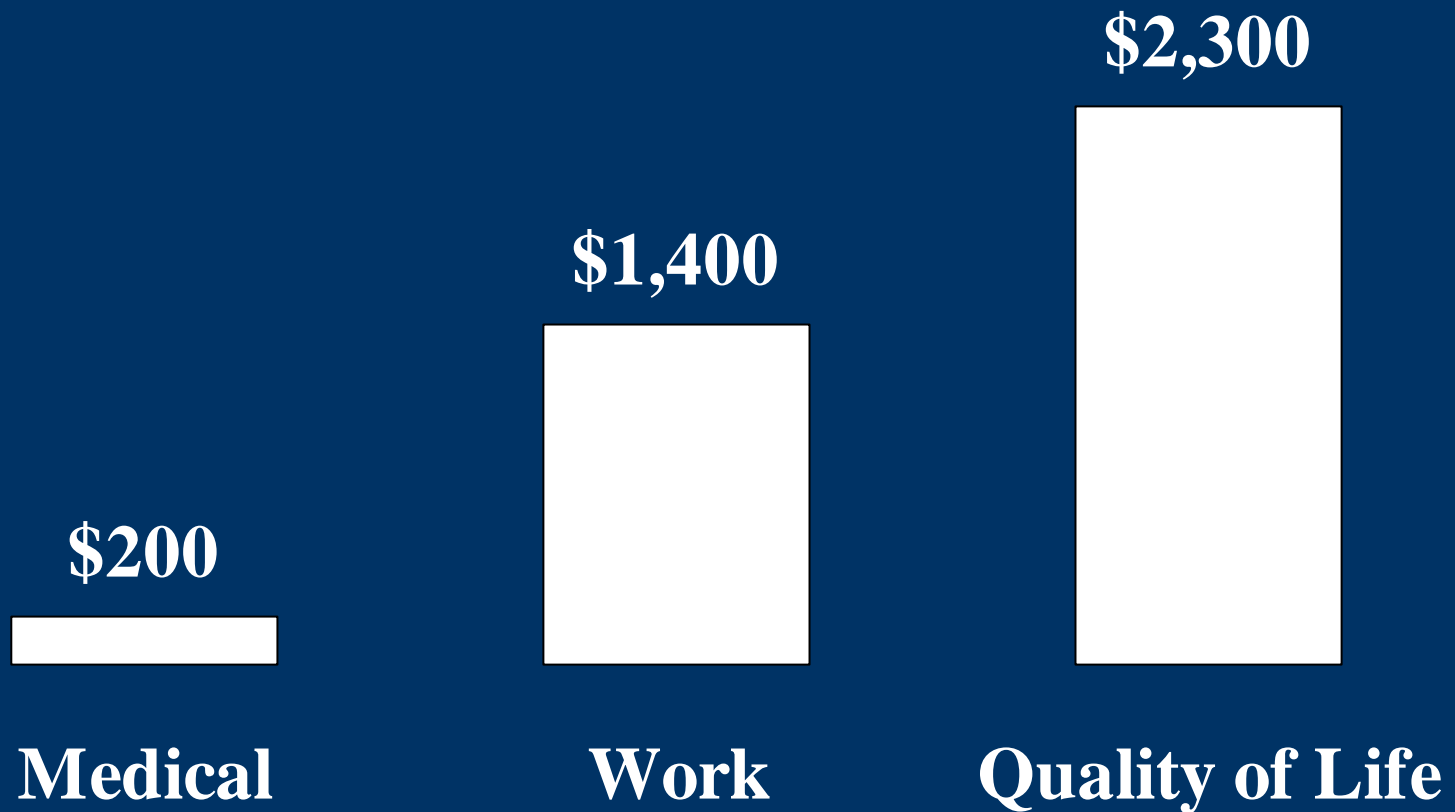
	Head injury	No head injury	Ratio	Note
Bried & al.	\$21,945	\$11,941	1.84	Incl MD charge
Max & al.	\$18,527	\$10,350	1.79	Est cost, not charge
NHTSA	\$27, 000	\$12,000	2.25	Brain injury
Orsay & al.	\$43,214	\$15,528	2.78	Severe head injury

% of M/C Crash Victims Who Suffer Head Injury by Place of Treatment				
Trauma Center	Helmet	Nonhelmet	Ratio	Note
Murdock & Waxman	27%	60%	2.2	
Murdock & Waxman	4%	19%	4.8	AIS=3
Murdock & Waxman	1%	7%	7.0	Disabling
Offner & al.	38%	66%	1.7	
Orsay & al.	30%	51%	1.7	
Orsay & al.	9%	19%	2.1	AIS=3
Rutledge & Stutts	28%	53%	1.9	AIS=2-5

% of M/C Crash Victims Who Suffer Head Injury by Place of Treatment

	Helmet	Nonhelmet	Ratio	Note
Hospital-admitted				
Bried & al.	1/6	1/2	3.0	
Rowland & al.	2.8%	8.4%	3.0	AIS↵2
Rowland & al	1.0%	3.6%	3.6	AIS↵4
Emergency Dept.				
Kelly & al.	24.1%	41.7%	1.7	Hd/neck
Shankar & al.	21%	40%	1.9	
All crash victims				
Karlson & Quade	3.4%	7.6%	2.2	

A motorcycle helmet costs \$200; a law adds \$1000 in discomfort & inconvenience costs/new user. That helmet saves \$3,900



Helmet laws

- Increase helmet use by 40%
- A helmet reduces the probability of a brain injury death by 37%

Motorcycle Insurance Coverage in the US, 1998-99 & A Comparison with Auto Insurance Coverage

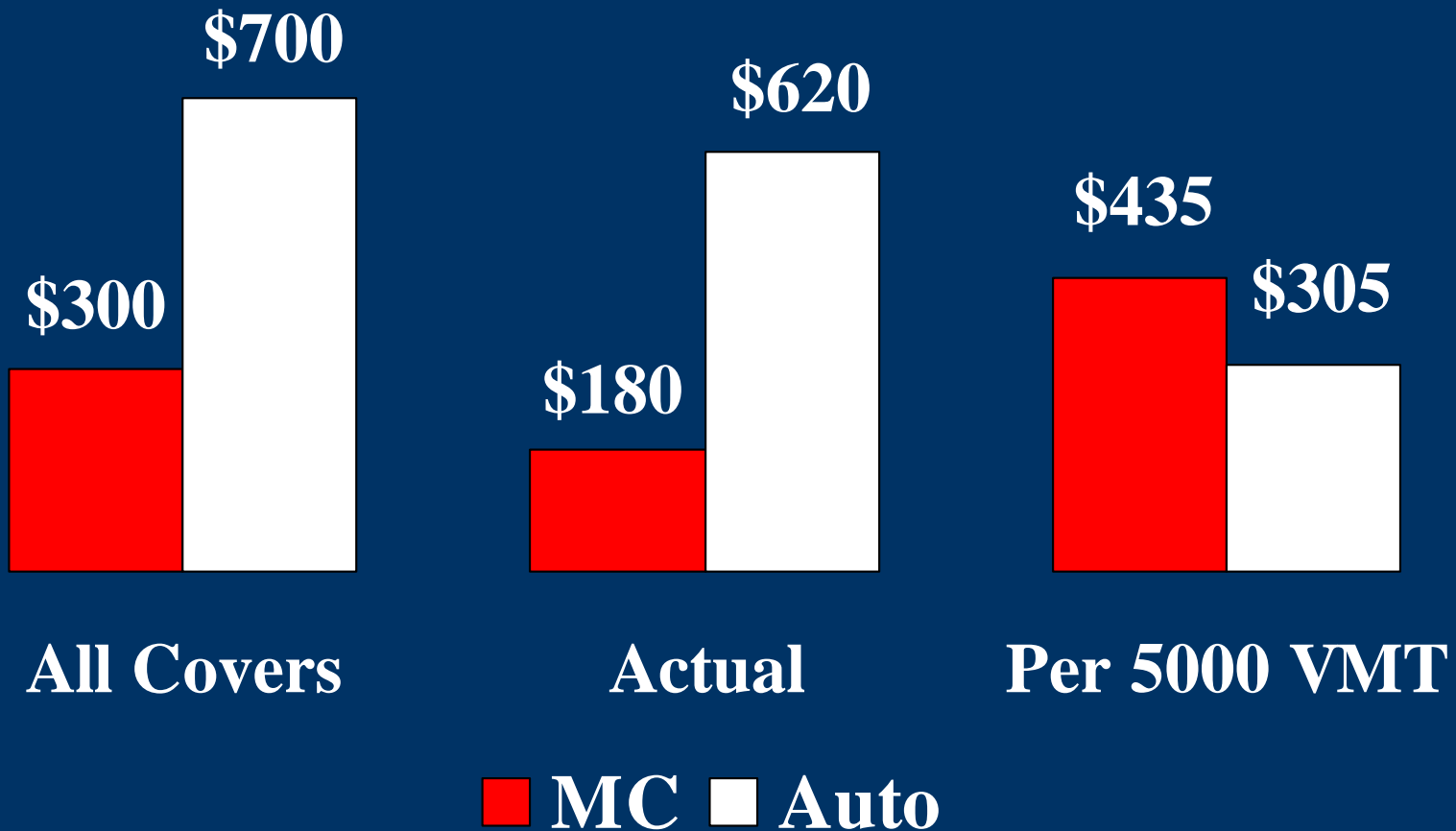
**Ted Miller & Bruce Lawrence
Pacific Institute for Research &
Evaluation**

M/C Coverage Is Narrower Than Auto Coverage; Less Mandates

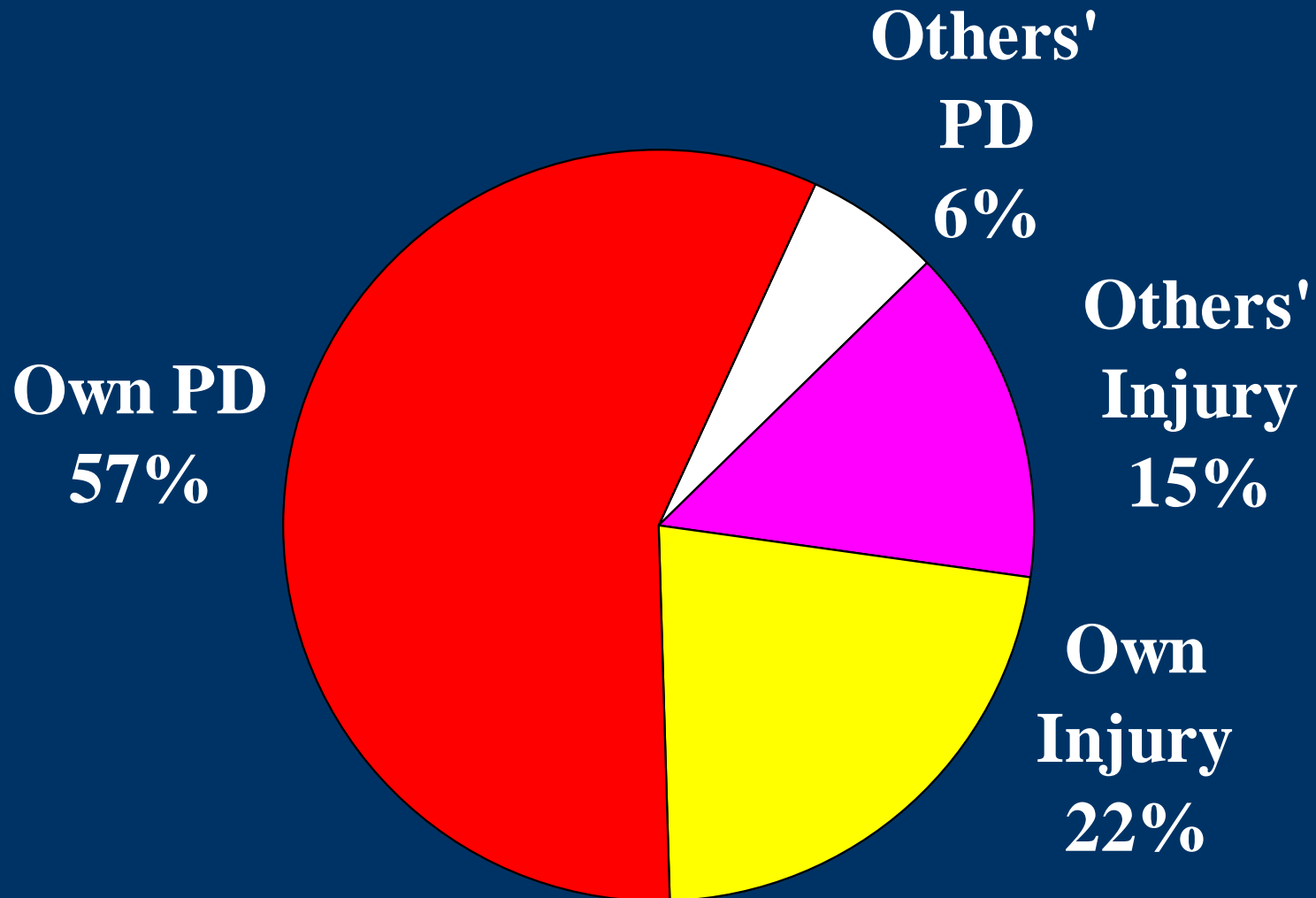
Coverage	Motorcycles	Other Vehicles
Bodily Injury Liability	87.1%	99.6%
Passenger Liability	24.1%	99.6% *
Property Damage Liability	85.4%	96.0%
Own Medical Expenses	11.5%	60.3%
Personal Injury Protection	3.8%	37.9%
Collision	52.3%	86.1%
Comprehensive	56.8%	90.8%
Uninsured Motorist	90.6%	99.9%

* Part of BI coverage

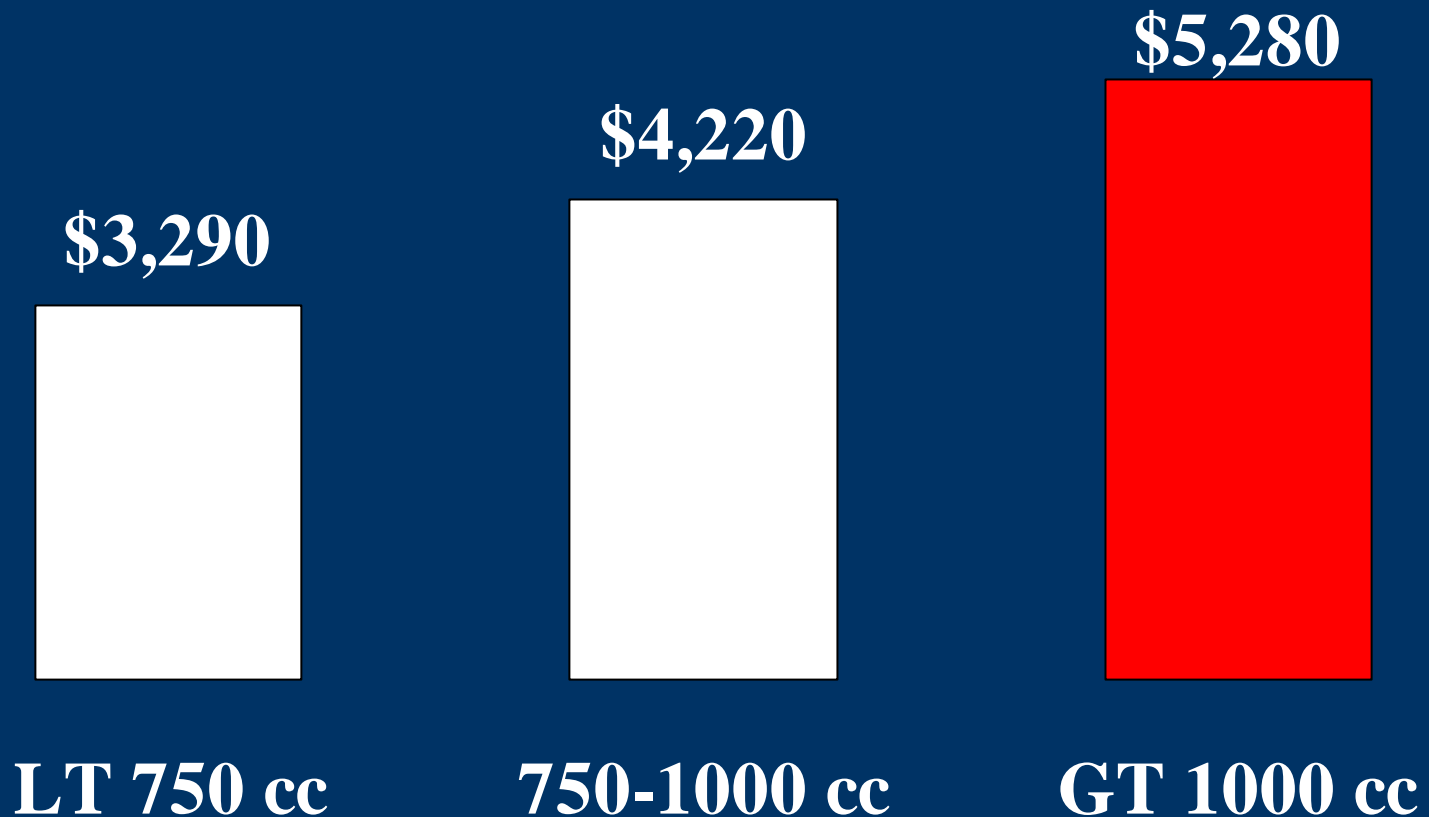
Premiums for Crash-related Coverage



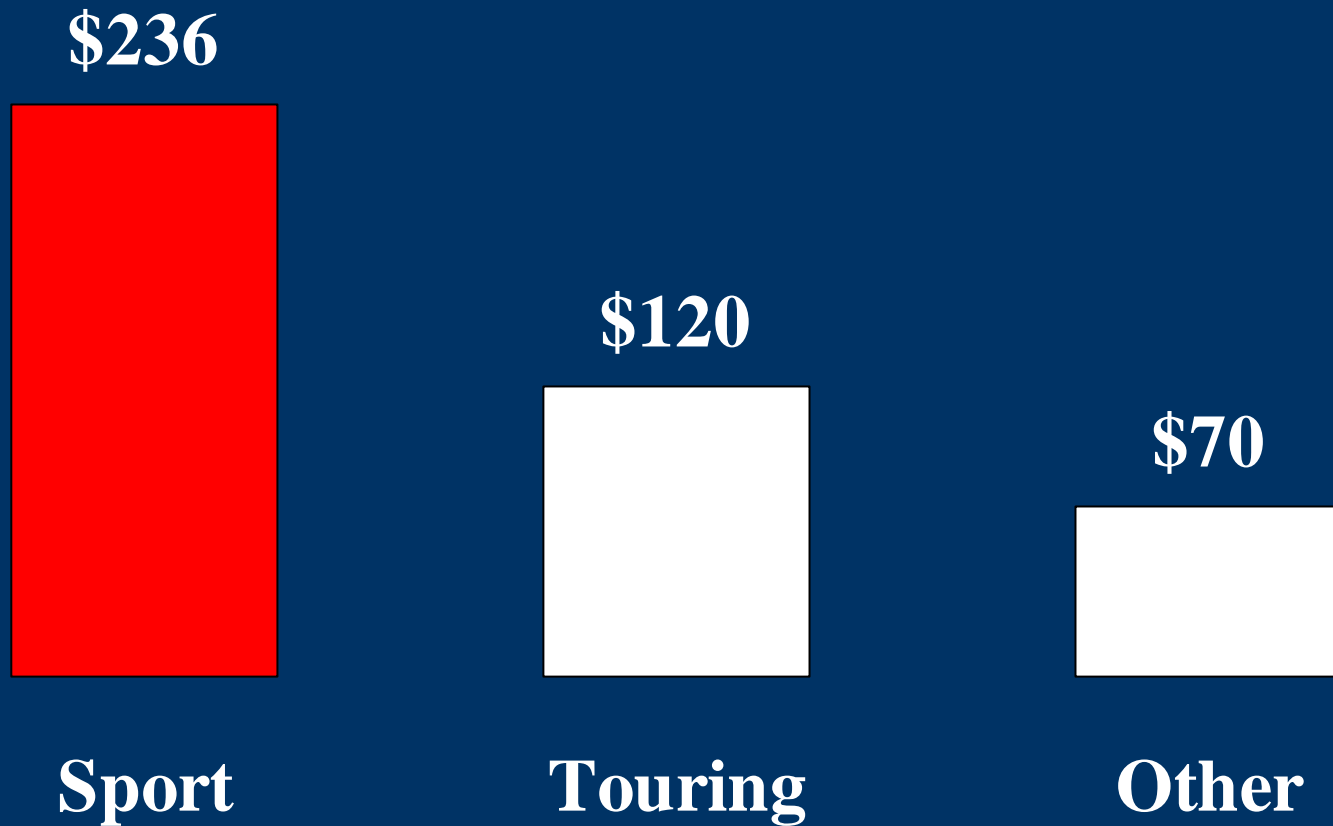
\$316 M Crash-related MC Claims in 1999



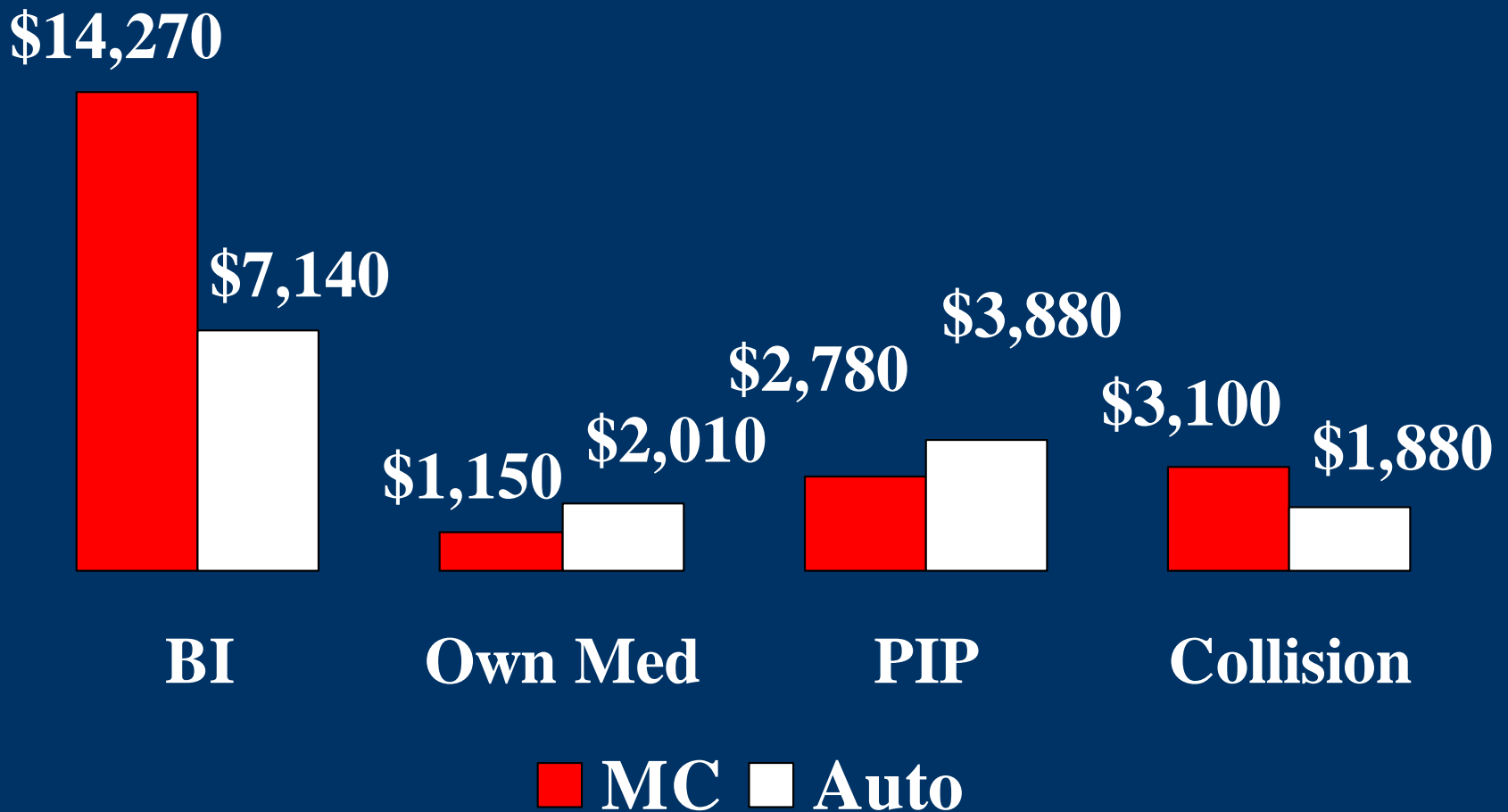
Cost/claim by Engine Size



Claims Paid/Policy

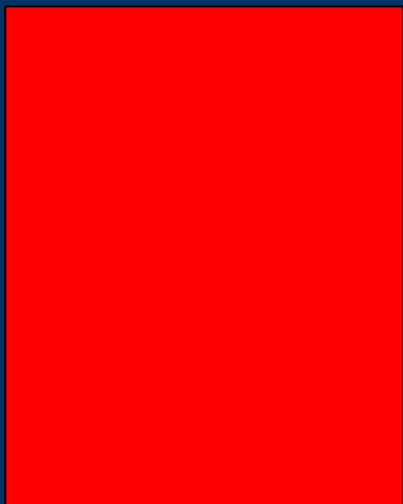


M/C Costs/Claim Differ From Auto



Crash-related Losses Per 5000 VMT Are Identical

\$180



MC

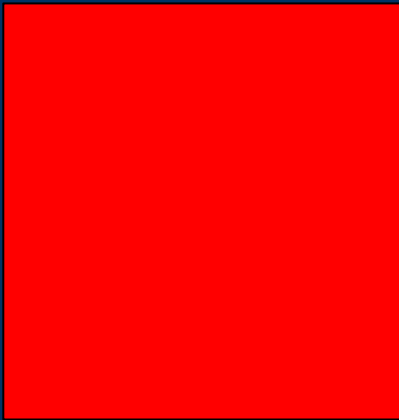
\$180



Auto

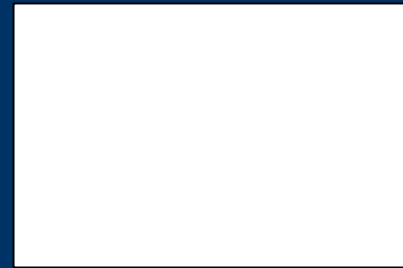
Remember M/C Coverage Is Narrower; Losses per 5000 VMT with All Covers

\$300



MC

\$190



Auto

SUMMARY

- MC injuries cost \$17.4 B in 2005
- Most costs are MC only crashes, unhelmeted; 34% of fatalities are DWI
- Medical cost of MC injury are about twice as high if a head injury occurs
- Total injury cost / MC crash = \$178K
- Medical cost / MC crash = \$27K
- Yet most research only looks at medical cost - most readily available

SUMMARY

- On avg, M/C insur costs \$180/year
- It primarily pays for cyclist property losses
- Prices & claims rise with engine size
- Sport bikes have bad loss experience
- Auto coverage is broader than M/C
- Per VMT, claims costs are higher for M/Cs than autos

How Do We Measure Lost Quality of Life?



Quality-Adjusted Life Year (QALY)

- QALYs are routinely used to evaluate the outcome of clinical trials & preventive health interventions
- A QALY is a health outcome measure that assigns a value of 1 to a year of perfect health and 0 to death
- Sum fraction of perfect health lost to an injury each year

How to Monetize

- Look at what people pay for safety
10,000 people spend \$350 on airbags
Reduce risk of death by 1 in 10,000
$$\$350 \times 10,000 = \$3.5\text{M}$$
- Value of statistical life =
work loss + QALY loss

Value of a Statistical Life

- Extra wages for risky work
- Highway safety
 - Speed choice
 - Use of safety devices (belts, helmets)
- Demand & price
 - Car safety features
 - Smoke detectors
 - Bicycle helmets
 - Cigarettes
 - Houses in dangerous/polluted areas
- WTP Surveys